

# RESIN SEALED TYPE SEMICONDUCTOR DEVICE

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Equivalents:

Original  
Translation

## Abstract

PURPOSE: To protect outer leads against deformation such as bend and to prevent soldering from deteriorating in reliability by a method wherein a support protruding from the side face of the outer lead toward an adjacent outer lead and insulators provided between the adjacent supports so as to connect them together are provided.

CONSTITUTION: A lead frame is provided with inner leads 2 provided around an island 1, outer leads 4 provided outside a resin sealed region 3 and connected to the inner leads 2, a tie bar 5 provided near the resin sealed region 3 to support the outer leads 4 interlinking them together, a support 6 whose ends are projected and recessed so as to enable them to be engaged with each other and which protrude from the side face of the outer lead 4 distant from a resin sealed region toward the adjacent outer lead 4, and an insulator 7 provided to be interposed between the adjacent supports 6 so as to interlink the supports 6 together. By this setup, leads can be protected against deformation caused by external shock and improved in reliability of soldering at mounting.

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## 明細書

## 発明の名称

樹脂封止型半導体装置

## 特許請求の範囲

半導体チップを含んで封止した樹脂体と、前記半導体チップと電気的に接続して前記樹脂体の外部に導出した外部リードとを有する樹脂封止型半導体装置において、前記外部リードの側面より隣合う外部リードへ向けて突出した支持部と、隣合う前記支持部の間に介在させて隣合う支持部を互に連結する絶縁体とを備えたことを特徴とする樹脂封止型半導体装置。

## 発明の詳細な説明

## 〔産業上の利用分野〕

本発明は樹脂封止型半導体装置に関する。

## 〔従来の技術〕

従来の樹脂封止型半導体装置は、第5図及び第

6図に示すように、アイランド1の周囲に配置して設けた内部リード2と、内部リード2に接続して樹脂封止領域3の外側に設けた外部リード4と、隣合う外部リード4の相互間を接続して支持するタイバー5とを有してリードフレームを構成し、アイランド1の上に半導体チップを搭載して樹脂体8で封止し、外部リード4をリードフレームから切離し、タイバー5を切落し、外部リード4を整形して半導体装置を形成する。

## 〔発明が解決しようとする課題〕

上述した従来の樹脂封止型半導体装置は、外部リードが樹脂体より平行に夫々独立して導出されているので、外部リードが曲がる等の変形を生じ実装時に半田付の信頼性が低下するという欠点がある。

## 〔課題を解決するための手段〕

本発明の樹脂封止型半導体装置は、半導体チップを含んで封止した樹脂体と、前記半導体チップと電気的に接続して前記樹脂体の外部に導出した外部リードとを有する樹脂封止型半導体装置にお

いて、前記外部リードの側面より隣合う外部リードへ向けて突出した支持部と、隣合う前記支持部の間に介在させて隣合う支持部を互に連結する絶縁体とを備えている。

#### [実施例]

次に、本発明について図面を参照して説明する。

第1図及び第2図は本発明の第1の実施例を説明するためのリードフレームの平面図及び半導体装置の側面図である。

第1図に示すように、アイランド1の周囲に配置して設けた内部リード2と、内部リード2と接続して樹脂封止領域3の外側に設けた外部リード4と、樹脂封止領域3の近傍に設けて外部リード4の相互間を接続して支持するタイバー5と、樹脂封止領域3より離れた位置の外部リード4の側面より隣合う外部リードへ向けて突出し、且つ先端が互に入り組むように凸部と凹部に形成された支持部6と、隣接する支持部6の間に介在させて支持部6を互に連結する絶縁体7とを有してリードフレームが構成される。

う外部リード相互間を連結することにより、外部からの衝撃によるリード変形の防止、及び実装時の半田付の信頼性を向上させるという効果を有する。

#### 図面の簡単な説明

第1図及び第2図は本発明の第1の実施例を説明するためのリードフレームの平面図及び半導体装置の側面図、第3図及び第4図は本発明の第2の実施例を説明するためのリードフレームの平面図及び半導体装置の側面図、第5図及び第6図は従来のリードフレームの一例を示す平面図及び半導体装置の側面図である。

1…アイランド、2…内部リード、3…樹脂封止領域、4…外部リード、5…タイバー、6…支持部、7…絶縁体、8…樹脂体。

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ドフレームが構成される。

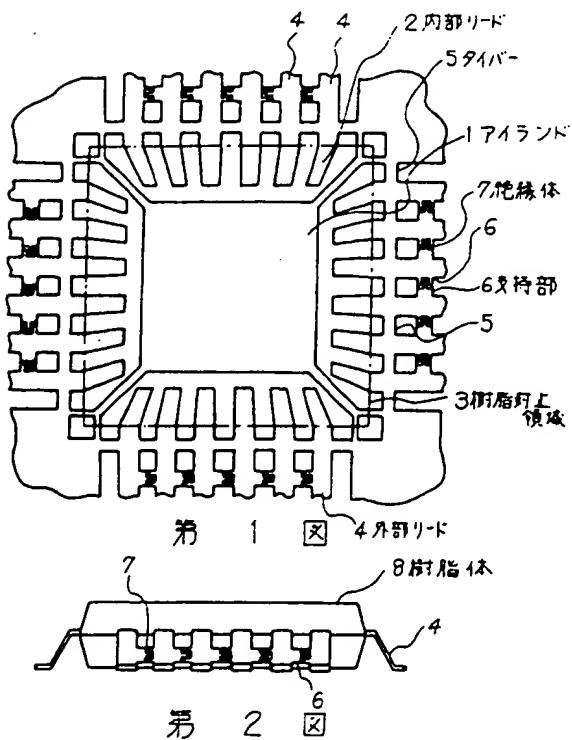
次に、第2図に示すようにアイランド上に半導体チップ(図示せず)を搭載し、半導体チップと内部リード間を電気的に接続し、樹脂体8により樹脂封止領域内を封止し、リードフレームより外部リード4及びタイバーを切離し、外部リード4を整形して半導体装置を構成する。

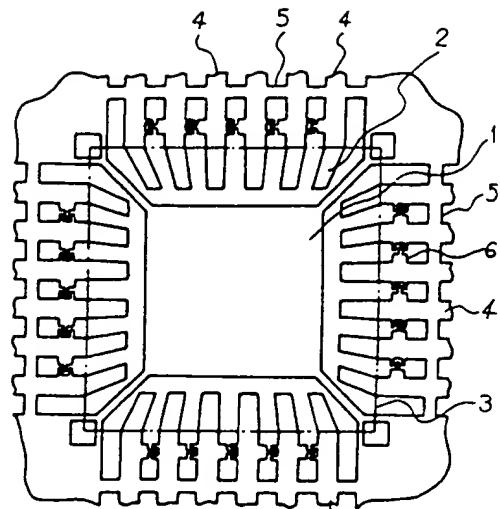
第3図及び第4図は本発明の第2の実施例を説明するためのリードフレームの平面図及び半導体装置の側面図である。

第3図及び第4図に示すように、隣合う外部リード4の側面に設けた支持部6が樹脂封止領域3の近傍に設けられ、タイバー5が支持部6の外側に設けられている以外は第1の実施例と同様の構成を有しており、支持部6を連結する絶縁体7を樹脂封止工程と同時に形成でき、製造工程を簡略化できる効果を有する。

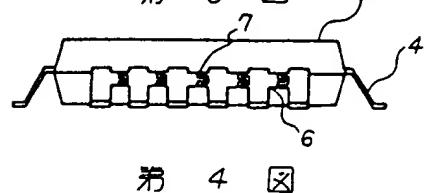
#### [発明の効果]

以上説明したように本発明は、外部リードの側面に設けた支持部の間に絶縁体を介在させて隣合

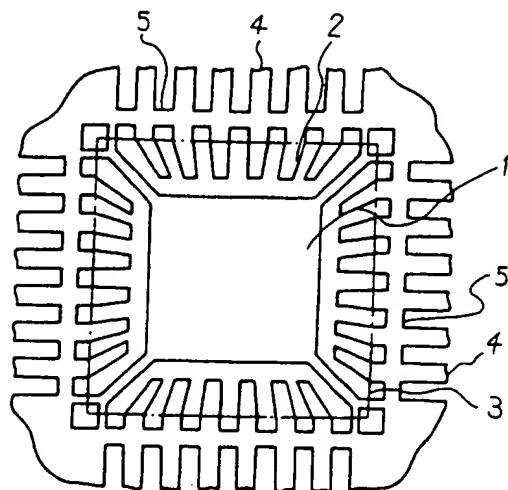




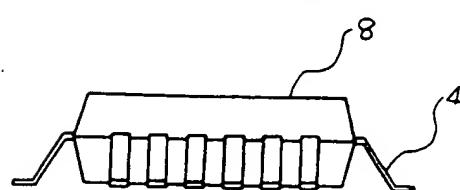
第 3 図



第 4 図



第 5 図



第 6 図

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## DETAILED DESCRIPTION

### [Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the surface mount type semiconductor device by which the resin seal was carried out.

[0002]

[Description of the Prior Art] It connects electrically to the interior derivation lead 6 of direct by the connection electrode called bump 4 as it connects electrically to the internal derivation lead 6 by the bonding wire 3 as a semiconductor chip 1 is carried in the die pad 2 of the leadframe made with the metal (0.1-0.3mm of board thickness [ For example, being 42%nickel/Fe alloy. ]) as a former and surface mount type semiconductor device shown to drawing 10 in the cross section of the example and it is shown in drawing 10 A, or shown in drawing 10 B. And after closing these with the sealing agents 5, such as an epoxy resin, the external derivation lead 7 and the external electrode 8 are bent and formed in a necessary configuration.

[0003] And as shown to drawing 11 A in a side elevation, as shown in a soldering paste 13 or drawing 11 B, adhesives 14 are applied to the pattern of a substrate 12 at the substrate 12, alignment of the surface mount type semiconductor device is carried out to this, and it is put on it. When a soldering paste 13 is used like drawing 11 A, this substrate 12 is heated by hot blast or infrared radiation, and is soldered. On the other hand, when adhesives 14 are used like drawing 11 B, it solders by being immersed in a solder tub.

[0004] However, the surface mount type semiconductor device mentioned above Since bending of the external derivation lead 7 and the external electrode 8 is carried out on the outside of the sealing agent 5 shown in drawing 10 A and B, According to the force from the variation of this process tolerance, and the outside after fabrication, as shown in the perspective diagram of drawing 12 A As shown in the variation of the position of the height direction of the inferior surface of tongue of the external electrode 8 to the base of the sealing agent 5 of a semiconductor device, and the plan of drawing 12 B, it is easy to produce deformation of the external derivation lead 7 to a longitudinal direction and the external electrode 8. These become a cause and a suitable surface mount becomes impossible the time of the above-mentioned substrate mounting. Or the technical problem of it becoming impossible to flow electrically occurred.

[0005] Then, in order to cancel this technical problem, like the semiconductor device currently indicated by JP,3-3354,A shown in drawing 13 , in the external electrode 8, it is the same field as the base of a sealing agent 5, and the configuration which drew in parallel with the base is proposed.

[0006]

[Problem(s) to be Solved by the Invention] by the way, it miniaturizes and electronic equipment thin-shape-izes in recent years -- having -- \*\*\*\* -- the semiconductor device used is also required as achieving a miniaturization and thin shape-ization as much as possible, and it has a size of the semiconductor chip by which the size of a sealing agent is carried in the interior closely now, and the thin shape semiconductor device 1.0mm or less has been put in practical use also for thickness However, in such small and the thin shape semiconductor device, the technical problem that a size, and about [ becoming large far from a semiconductor chip size ] and thickness will become thick occurred in a configuration which is indicated by JP,3-3354,A shown in above-

mentioned drawing 13. while this invention maintains the mechanism in which deformation of an external electrode or the variation at the time of processing is prevented -- moreover -- a miniaturization -- a thin shape -- it aims at offering the resin-seal surface mount type semiconductor device [-izing / a semiconductor device ]

[0007]

[Means for Solving the Problem] In order to solve a technical problem which was described previously, this invention used as the electrical installation portion, i.e., external electrode, with the exterior of a semiconductor device the rear face of an internal derivation lead electrically connected with an internal derivation lead by a semiconductor chip, a bonding wire, or the bump using the leadframe which has a die pad in the same flat surface.

[0008]

[Function] Therefore, since the resin-seal surface mount type semiconductor device of this invention used as the electrical installation portion, i.e., external electrode, with the exterior of a semiconductor device the rear face of an internal derivation lead electrically connected with an internal derivation lead by a semiconductor chip, a bonding wire, or the bump using the leadframe which has a die pad in the same flat surface, it can make the size of a semiconductor device small to the almost same size as the size of a semiconductor chip. Moreover, thickness of a semiconductor device can be made thin.

[0009]

[Example] Hereafter, the resin-seal surface mount type semiconductor device of the example of this invention is explained in full detail with a drawing. The cross section of the 1st example is shown in drawing 1. First, drawing 1 A lays a semiconductor chip 1 in the die pad 2 of a leadframe with a thickness of 0.1-0.3mm, connects electrically the internal derivation lead 6 with which a semiconductor chip 1 and a rear face serve as the external electrode 8 by the bonding wire 3, and has structure which carried out the resin seal of the upper part. Drawing 1 B shows the example with which it is made to connect electrically a semiconductor chip 1 and the internal derivation lead 6 by the bump 4 similarly. Although there is an advantage that the electrical installation by the bump 4 can make still smaller the size of the structure top sealing agent 5 from the electrical installation method by the bonding wire 3, since the thickness of the resin of the inferior surface of tongue of a semiconductor chip 1 also becomes thin so that the board thickness of a leadframe is thin, it becomes easy to generate faults, such as a void at the time of a resin seal (foam).

[0010] The creation method of the semiconductor device of the 1st example is briefly explained using the cross section of drawing 2 and drawing 3. First, the cross section of drawing 2 explains the 1st creation method. As shown in drawing 2 A, the internal derivation lead 6 connects electrically the semiconductor chip 1 and the internal derivation lead 6 with a die pad 2 by the bonding wire 3 after laying a semiconductor chip 1 using the leadframe in a coplanar by the same method as usual. Next, the sealing agents 5, such as an epoxy resin, are used and closed. And it is made the configuration which shaves off the rear-face resin section of a semiconductor device, and is shown in drawing 2 B. Then, in order to improve the soldering nature at the time of performing substrate mounting, it becomes like drawing 2 C by giving sheathing plating 9 of solder etc. to the portion which the external electrode 8 exposed. In this way, if the excessive portion of the outside of the external derivation lead 7 of the semiconductor device which was able to be done is cut using metal mold etc., the semiconductor device of this example shown in drawing 2 D will be obtained. Below, the cross section of drawing 3 explains the 2nd creation method. After laying a semiconductor chip 1 and connecting electrically like the 1st creation method, it becomes the configuration shown in drawing 3 A by performing a resin seal with the metal mold which has a cavity (\*\*\*\*\*\*) only in the upper surface. Then, the semiconductor device of this example shown in drawing 3 B is obtained like the 1st creation method by performing cutting of the sheathing plating 9 and the external derivation lead 7. Although pretreatment called deburring \*\* by high-pressure water etc. is needed before giving sheathing plating 9 since the barricade at the time of a resin seal etc. may have adhered to the portion which is going to give sheathing plating 9 in the case of this creation method, the work of shaving off a stiff closure resin like the 1st creation

method is omissible.

[0011] The cross section of the 2nd example is shown in drawing 4. Although not structurally divided \*\*\*\*\* with the 1st three operations, the thickness of the die pad 2 which lays a semiconductor chip, and the external electrode 8 consists of very thin (about 10-30 micrometers) conductors, such as copper foil. The structure of this example becomes possible [ making thin hundreds of micrometers thickness of a semiconductor device compared with the 1st example ]. Moreover, since the rear face of a semiconductor chip 1 has structure exposed outside through direct or a metal part, there is also an advantage of being easy to miss the heat generated from a semiconductor device, after substrate mounting at the time of use. The creation method of the semiconductor device of this 2nd example is briefly explained using the cross section of drawing 5. Although a leadframe is used in the 1st example mentioned above Lamine thin conductors, such as copper foil, on the films 10, such as a polyimide which the hole opened partially as shown in drawing 5 A by this example, and a die pad 2, the internal derivation lead 6, and the external wiring 11 are formed. this conductor -- a semiconductor chip 1 is laid in the with \*\*\*\* film 10 like the above-mentioned method, and it connects with it electrically, and if a resin seal and sheathing plating 9 are given, it will become the structure which shows the cross section in drawing 5 B. Furthermore, if a film 10 is exfoliated giving heating etc., it will become the structure of this example as shown in drawing 5 C. In addition, in case a film 10 is exfoliated on the outside of the external electrode 8 used for this example, it is good to make thin beforehand external wiring 11 connected to an external electrode as shown in the plan of drawing 5 D so that a portion with an excessive conductor may cut simultaneously.

[0012] The cross section of the 3rd example is shown in drawing 6. In the 3rd example, it has the films 10, such as a polyimide, under the die pad 2 which lays a semiconductor chip 1. Although there are not an example mentioned above and a changing place out of it, since only the part of the thickness of the external electrode 8 has a film 10 in a high place to the height of the base of the external electrode 8 used as a part for the connection at the time of substrate mounting in the case of this example, there is an advantage that there is a cleaning effect of the flux after substrate mounting. Moreover, since there is no portion electrically connected with the rear face of a semiconductor chip 1 in the center of a semiconductor device, there is also imitation or an advantage that there is nothing, about which short fault generated at the time of substrate mounting. In addition, although drawing where a die pad 2 exists has explained by this example, on the occasion of operation, it is not necessarily the need. The creation method of the semiconductor device of the 3rd example is briefly explained using the cross section of drawing 7. In the 3rd example, thin conductors, such as copper foil, are laminated on the films 10, such as a polyimide which the hole opened partially as shown in drawing 7 A, a die pad 2, the internal derivation lead 6, and the external wiring 11 are formed, and it becomes the structure which shows the cross section in it at drawing 7 B when a semiconductor chip 1 is laid in the film 10 to which this conductor was attached like the above-mentioned method, it connects with it electrically and a resin seal and sheathing plating 9 are given to Furthermore, if the film 10 of the semiconductor device circumference is exfoliated giving heating etc., it will become the structure of this example as shown in drawing 7 C. In addition, it is good to make thin beforehand external wiring 11 of the outside of the external electrode 8 like the 2nd example, so that it may be easy to cut in case a film 10 is exfoliated.

[0013] Furthermore, as the 4th and 5th examples, as a cross section is shown in drawing 8, it is created more easily than the example which has also mentioned above the structure which has arranged the external electrode 8 doubly. In the case of the structure of this example, although the size of a semiconductor device becomes somewhat large from the above-mentioned example, since the interval of external electrode 8 comrades is made widely, there is an advantage of being hard to generate the bridge (inter-electrode short-circuit) by the solder at the time of substrate mounting.

[0014] Moreover, it sets in the 3rd example shown in the cross section of drawing 6 as the 6th example. Since the field which minded the rear-face section of a semiconductor chip 1 or resin material other than sealing agent 5 by removing the film 10 in the center section of the completed

semiconductor device as shown in a cross section is made still more highly than the inferior surface of tongue of the external electrode 8 There is an advantage that the cleaning effect at the time of foundation mounting which the 3rd example described by the way goes up more.

[0015]

[Effect of the Invention] Since the rear face of the node of an internal derivation lead was used as the external electrode of a semiconductor device, with the semiconductor device of this invention, the semiconductor device of the size near the size of a semiconductor chip can be offered, so that clearly from the above explanation. Moreover, the semiconductor device of the thickness around about 0.5mm can be offered also about thickness.

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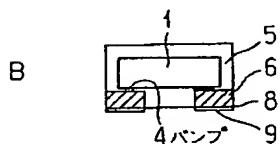
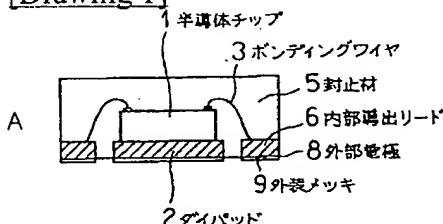
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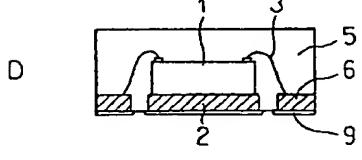
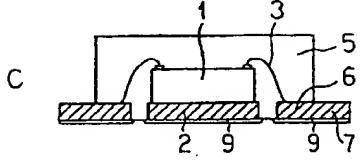
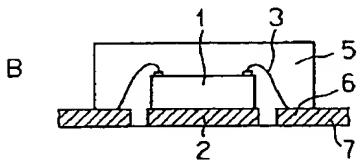
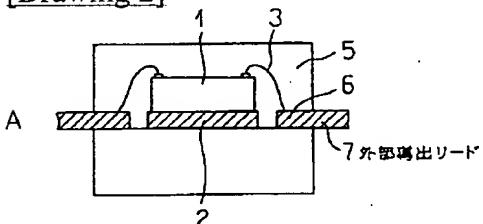
DRAWINGS

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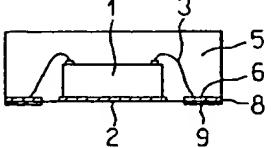
## [Drawing 1]

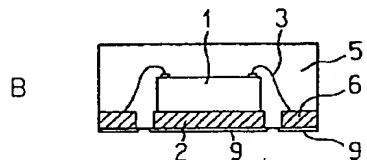
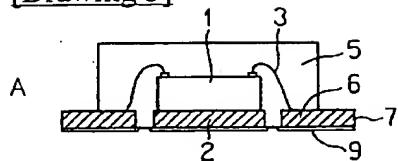
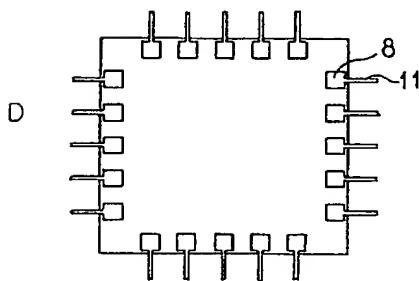
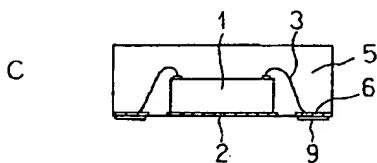
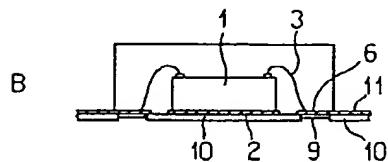
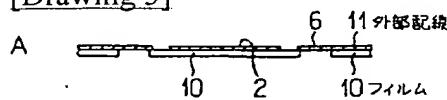
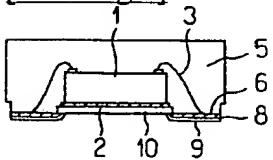
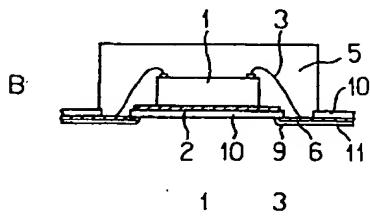
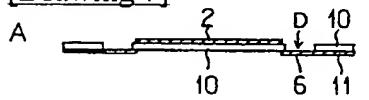


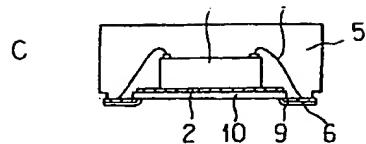
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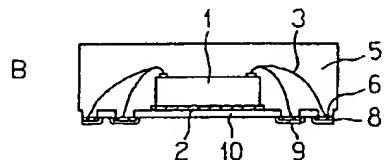
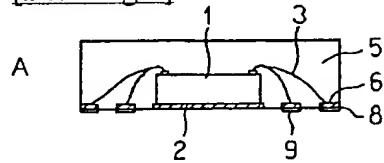
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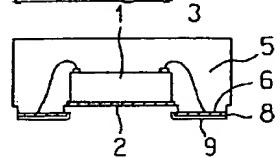
[Drawing 3][Drawing 5][Drawing 6][Drawing 7]



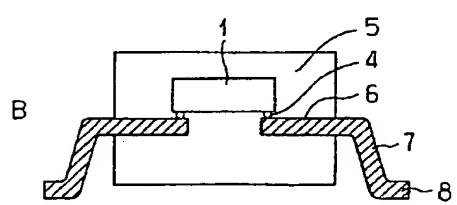
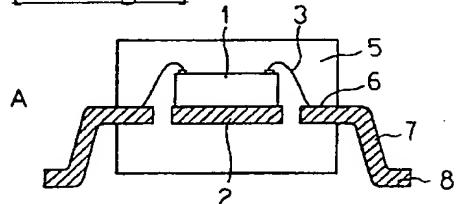
[Drawing 8]



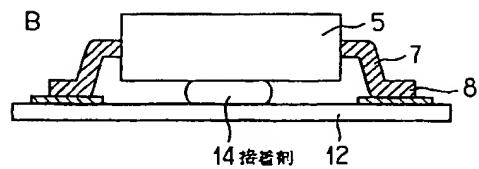
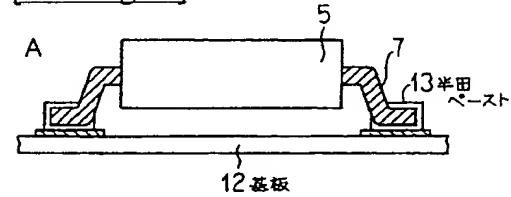
[Drawing 9]



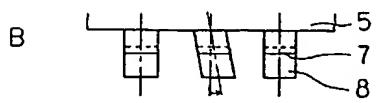
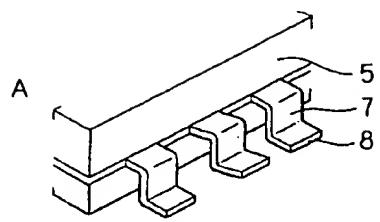
[Drawing 10]



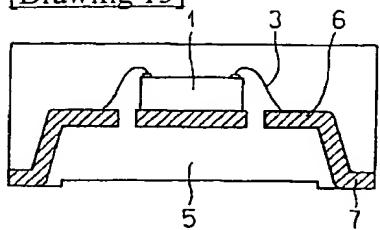
[Drawing 11]



[Drawing 12]



[Drawing 13]



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[Translation done.]